BESCHWERDEKAMMERN DES EUROPÄISCHEN PATENTAMTS | BOARDS OF APPEAL OF THE EUROPEAN PATENT OFFICE | CHAMBRES DE RECOURS DE L'OFFICE EUROPEEN DES BREVETS

Internal distribution code:
(A) [ ] Publication in OJ
(B) [ ] To Chairmen and Members
(C) [X] To Chairmen

D E C I S I O N
of 25 April 1996

Case Number: T 0956/92 - 3.3.1

Application Number: 86101916.4

Publication Number: 0191502

IPC: C07F 7/16

Language of the proceedings: EN

Title of invention:
Tin containing activated silicon for the direct reaction

Patentee:
UNION CARBIDE CORPORATION

Opponent:
Bayer AG, Leverkusen Konzernverwaltung RP Patente Konzern

Headword:
activated silicon/UNION CARBIDE

Relevant legal provisions:
EPC Art. 54(1), 111(1)

Keyword:
"Novelty (yes) - after amendment"
"Remittal for consideration of inventive step"

Decisions cited:
T 0012/81, T 0017/85

Catchword:
-

Europäisches Patentamt | European Patent Office | Office européen des brevets

Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 0956/92 - 3.3.1

D E C I S I O N
of the Technical Board of Appeal 3.3.1
of 25 April 1996

Appellant: (Proprietor of the patent)
UNION CARBIDE CORPORATION
39 Old Ridgebury Road
Danbury
Connecticut 06817 (US)

Representative:
Wuesthoff, Franz, Dr.-Ing.
Wuesthoff & Wuesthoff
Patent- und Rechtsanwälte
Schweigerstrasse 2
D-81541 München (DE)

Respondent: (Opponent)
Bayer AG, Leverkusen
Konzernverwaltung RP
Patente Konzern
Bayerwerk
D-51368 Leverkusen (DE)

Representative: -

Decision under appeal: **Decision of the Opposition Division of the European Patent Office posted 18 August 1992 revoking European patent No. 0 191 502 pursuant to Article 102(1) EPC.**

Composition of the Board:

Chairman: A. J. Nuss
Members: R. K. Spangenberg
S. C. Perryman

Summary of Facts and Submissions

I. This appeal was filed against the decision of the Opposition Division of the EPO, dated 18 August 1992, to revoke European patent No. 0 191 502, granted in response to European patent application No. 86 101 916.4.

II. The decision under appeal was based on the text of the patent as granted, containing 4 claims.

In the decision under appeal the following document was cited:

(D1) DE-A-3 425 424

The sole ground of revocation was that the subject-matter of Claim 1 as granted lacked novelty, since D1 contained examples which fell within the ambit of that claim.

III. Together with the statement of grounds of appeal the Appellant (the proprietor of the patent) filed two amended sets of claims, the second one containing three claims which were substantially identical with Claims 2 to 4 as granted.

IV. Oral proceedings took place on 25 April 1996.

At the end of the oral proceedings, the Appellant requested that the decision under appeal be set aside and the case remitted to the Opposition Division for examination of inventive step on the basis of a set of

three claims submitted during the oral proceedings. This set was identical with the set of claims of the above second auxiliary request. Claim 1 of this set read as follows:

"1. An activated silicon composition for use in the direct reaction of methyl chloride to produce dimethylchlorosilane comprising silicon and, based on the amount of silicon,

(a) 0.05 - 1.0 wt % Cu;

(b) 0.05 - 0.20 wt % Zn; and

(c) 0.001 - 0.01 wt % Sn; wherein the Zn to Sn ratio is 10 - 100 or preferably 20 - 50."

In support of his request, the Appellant argued that there was not any disclosure in D1 of the **combination** of the ranges of concentrations as claimed, particularly of the Zn to Sn ratios required by that claim. He further submitted, based on a graphic presentation of the experimental data contained in Table I, lines 3 and 6 to 8 and Table III, lines 5 and 6 of the description of D1, that, on the basis of an extrapolation of these data to copper concentrations of less than 1 weight % based on silicon, a skilled person would not have seriously contemplated to perform the process broadly described in D1 with an activated silicon containing copper, zinc and tin in the amounts and relations required by Claim 1 of the patent in suit, although there was some overlap with the broad definitions of the activated silicon contained in Claim 8 of D1.

V. The Opponent (the Respondent) requested that the appeal be dismissed.

He substantially argued, relying on decision T 17/85 (OJ EPO 1986, 406), that the subject-matter of the above claim lacked novelty, since the amounts of Zn, Cu and Sn as well as the Zn/Sn ratio were almost completely anticipated by Claim 8 of D1, read in combination with lines 1 and 2 of Table III of the description. In his submission the only difference between the subject-matter of Claim 1 of the patent in suit and the disclosure of D1 was the copper concentration, which fell just outside the claimed range. Since no particular advantages, effects or properties were involved, as could be seen from a comparison of Examples 4J and 4L with Examples 4G and 4H of the patent in suit, so that there was no new selection from the ranges defined in Claim 8 of D1. In addition, he contested the correctness of the Appellant's graphic analysis of the data contained in Tables I and III of D1 and argued that a correct analysis should be based on lines 3 and 8 of Table I of D1 only, since in these lines approximately equal concentrations of tin, based on silicon, were disclosed. Taking into account that copper was the most expensive additive in the activated silicon, and that, moreover, the use of high amounts of copper had further disadvantages as set out in the patent in suit, the skilled person would have had good reasons to consider to use an activated silicon containing the lowest possible amount of copper indicated in D1, ie 0.5 weight %, based on silicon. In his opinion the skilled person would have seen from the comparison of lines 3 and 8 of Table I that the ratio of tin to copper should be increased in order to compensate for the decrease of the reaction rate caused by the reduction of the copper concentration, and would thus have maintained the amounts of tin and zinc as indicated in lines 1 and 2 of

Table III of D1 while further reducing the amount of copper within the limits set by Claim 8. In doing so, the skilled person would therefore inevitably have arrived at an activated silicon composition falling within the definition of the present Claim 1.

VI. At the end of the oral proceedings the decision of the Board to allow the Appellant's request was announced.

Reasons for the Decision

1. The appeal is admissible.

2. Claims 1 to 3 submitted during the oral proceedings correspond to Claims 2 to 4 as granted, which are based on Claims 4, 6 and 9 as filed. The amended claims therefore meet the requirements of Article 123(2) and (3) EPC. This was not contested by the Respondent.

3. The sole issue that remains to be decided in this appeal is that of the novelty of the subject-matter of Claims 1 to 3. Novelty of that subject-matter was contested in respect of D1.

3.1. D1 teaches a method for making alkylchlorosilanes via the "Direct Reaction", comprising the use of an effective amount of a copper-zinc-tin catalyst. The effective amounts of copper, zinc and tin are defined broadly as follows: 0.5-10 wt. % copper based on the weight of silicon, 0.01-0.5 parts of zinc per part of copper, and 200-3000 parts per million (ppm) of tin relative to copper (see Claim 8).

3.2. Regarding specific examples, D1 discloses in lines 1 and 2 of Table III an activated silicon which contains 1.5 weight % of copper, based on silicon, and sufficient zinc and tin to obtain a zinc to copper ratio of 0.05 and a tin concentration of 1000 ppm, based on copper. It follows, as submitted by the Respondent, that this activated silicon contains 1.5 weight % copper, 0.075 weight % zinc and 0.0015 weight % tin, based on silicon, so that the zinc to tin ratio is 50. Line 5 of Table IIA shows that at a copper concentration of 1.5 weight %, based on silicon, a tin concentration of 1000 ppm, based on copper, and a ratio of zinc to copper of 0.048, amounting to 0.072 weight % zinc and 0.0015 weight % tin (based on silicon) and a zinc to tin ratio of 48, a reaction rate, expressed as K_p (ie g silane per g silicon and hour, see D1, page 14, lines 12 to 13) of 51 and a selectivity (expressed as the trichloro/dichloro ratio T/D) of 0.042 was obtained. Line 6 of the same table shows that at a copper concentration of 1.5 weight %, based on silicon, a tin concentration of 1000 ppm, based on copper, and a ratio of zinc to copper of 0.054, amounting to 0.081 weight % zinc, 0.0015 weight % tin (based on silicon) and a zinc to tin ratio of 54, a K_p of 38 and a T/D ratio of 0.056 was obtained. It follows from the comparison of these two reactions that under similar conditions quite different reaction rates and selectivities may be obtained.

3.3. The sole difference between the activated silicon defined in Claim 1 of the patent in suit and the above-mentioned activated silicon compositions disclosed in Table IIA of D1 consists in the copper content, which is outside the claimed range. Nevertheless, the Board is unable to agree with the Respondent's submission that the above specific compositions, when read in combination with Claim 8, **implicitly disclose** an activated silicon containing the lowest possible amount

of copper disclosed in Claim 8, namely 0.5 weight % (based on silicon) and containing the same amounts of tin and zinc as disclosed eg in lines 1 and 2 of Table III.

3.4. In this respect, the Board considers that the skilled person would have learnt from Claim 8 of D1 that, in contrast to the copper concentration, which is based on the amount of silicon, the concentrations of zinc and tin are correlated to the amount of **copper** present, and not to the amount of silicon, thus rather suggesting that the relation of the amounts of these metals to the amount of copper and not, as submitted by the Respondent, their relation to the amount of silicon should be maintained unchanged.

Furthermore, Table III of D1 reveals that the reaction rate decreases as copper concentrations are decreased from 10 wt. % to 1.5 wt. % of the silicon charged to the reactor, ie that the reaction rate decreases with the copper content of the silicon, and that it further follows from the experimental data contained in Tables I, II, IIa and III of D1 that in order to obtain optimal reaction rates and selectivities, different concentrations of zinc and tin, based on copper, must be used for different copper concentrations, based on silicon (compare eg lines 3 and 8 of Table I or line 9 of Table II with line 5 of Table IIA).

In addition, the Respondent himself had submitted during the oral proceedings, relying on the experimental data contained in lines 3 and 8 of Table I (which show that with an activated silicon containing 5 weight % copper, based on silicon, 1000 ppm tin, based on copper, and 10 weight % zinc, based on copper, on the one hand, and with an activated silicon containing 1.5 weight % copper, based on silicon, 3000 ppm tin, based on copper,

and 10 weight % zinc, based on copper, on the other hand, almost equal reaction rates were obtained), that a skilled person would have considered to compensate for the negative influence of the reduction of the copper concentration on the reaction rate by an increase of the tin to copper ratio.

3.5. The examples with 1.5 weight % copper referred to in the previous paragraph, are the compositions with the lowest copper concentration for which specific values for the concentration of all three components copper, zinc and tin are given. Thus there are no specific examples which anticipate the present claim 1. Whereas claim 8 of D1 can be taken as suggesting that copper concentration can be reduced to as low as 0.5 % based on silicon, and thus within the range for copper concentrations required by the claim 1 now put forward, the Board cannot interpret the ranges for copper, zinc and tin given in claim 8 of D1, as a disclosure that any copper concentration down to 0.5 % is suitable together with any arbitrarily chosen value for zinc within the whole range given for zinc in claim 8 of D1 and together with any arbitrarily chosen value for tin within the whole range given for tin in claim 8 of D1. Rather, as discussed in the previous paragraph, the implication of D1 as a whole is that only selected values would work, but no clear and certain rule is stated or derivable as to how to extrapolate from the given examples with a copper content of 1.5% based on silicon, to a copper content of 1% or below. Thus as the person skilled in the art is not in D1 given a clear and unambiguous indication to choose a combination of the three components, copper, zinc and tin that would satisfy each of the limited ranges for these three components claimed in present Claim 1, D1

does not destroy the novelty of the claim. Whether the skilled person, having considered D1, might not nevertheless be led to operate in the area of what is claimed by the present claim remains a matter to be assessed when considering inventive step.

4. The Respondent's submission that novelty should not be acknowledged in the present case was inter alia based upon the submission that the present case was similar to that decided in T 17/85. However, in the Board's judgment in the present case three concentration ranges **and their interrelations** are important, whereas in T 17/85 only one concentration range was considered. In contrast to the case decided in T 17/85, Claim 1 of the patent in suit is not simply directed to a range of the copper concentration in the activated silicon overlapping with the range broadly disclosed in D1 and falling just outside the range of the specific examples contained in D1, but rather defines the adaptation of the concentrations of two other components (zinc and tin) to the said copper concentrations necessary in order to maintain an acceptable overall performance of the activated silicon composition. It is this **"new element"** (see T12/81, OJ EPO 1982, 296; point 14.2 of the reasons), or, in other words, this new piece of technical information, that confers novelty on the claimed subject-matter.

5. Therefore, there was no need to consider the technical effects which may or may not be obtained with the activated silicon according to Claim 1 of the patent in suit in respect of any activated silicon explicitly or implicitly disclosed in D1 in order to decide the issue of novelty of Claim 1 of the patent in suit.

6. Claims 2 and 3 relate to the use of the activated silicon defined in Claim 1. Their subject-matter does therefore not form part of the state of the art represented by D1 for substantially the same reasons as set out above.

7. The sole ground for revocation stated in the decision under appeal does thus not prejudice the maintenance of the patent with the amended set of claims. However, the Opposition Division has not yet had an opportunity to consider the objections in respect of the inventive step raised by the Respondent. The Board makes therefore use of its power under Article 111(1) and remits the case to the Opposition Division for further consideration, as requested by the Appellant.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The matter is referred back to the first instance for further consideration on the basis of the sole request submitted at the oral proceedings on 25 April 1996.

The Registrar: The Chairman:

E.Görgmaier A. Nuss